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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,145	03/01/2002	Nello Cristianini	02331-0171 (42286-267668)	4408

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JOHN S. PRATT, ESQ
KILPATRICK STOCKTON, LLP
1100 PEACHTREE STREET
ATLANTA, GA 30309

EXAMINER	
HIRL, JOSEPH P	

ART UNIT	PAPER NUMBER
2121	5

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,145	CRISTIANINI, NELLO	
	Examiner	Art Unit	
	Joseph P. Hirl	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 March 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-17 are pending in this application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 10 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Each claim uses the term "dirty" which is a relative term and renders the claim indefinite.

4. Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Dichotomy relates to a division into two with a first eigenvector as a reference but the dichotomy is never completed since there is no identification of the second eigenvector.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. Claims 1-17 are rejected under 35 U.S.C. 102(a) as being anticipated by Cristianini / Shawe-Taylor (Cambridge Press, ISBN 0 521 78019 5, referred to as **CST**).

Claim 1

CST anticipates filling a kernel matrix with a plurality of kernels, each kernel comprising a pairwise similarity between a pair of data points within a plurality of data points in the dataset (**CST**, p 30, l 21-35); defining a fully-connected graph comprising a plurality of nodes and a plurality of edges connecting at least a portion of the plurality of nodes with other nodes of the plurality, each edge of the plurality of edges having a weight equal to the kernel between a corresponding pair of data points, wherein the graph has an adjacency matrix that is equivalent to the kernel matrix (**CST**, p 2, l 22-46; p 30, l 21-35; Examiner's Note (EN): from the applicant's definition, kernel matrix is equivalent to an adjacency matrix which is equivalent to a fully connected graph which has nodes and weights for edges; CST in the referenced sections has graphs (decision trees that are fully connected) with nodes and connections (chemical values are weights) with adjacency addressing local vertices and which can be a kernel matrix); computing a plurality of eigenvalues for the kernel matrix (**CST**, p 33, l 16-17); selecting an eigenvector corresponding to the smallest non-zero eigenvalue of the plurality of

eigenvalues (**CST**, p 33, l 29-32; EN: non-negative eigenvalues will contain a range of values to include a smallest non-zero value); bisecting the dataset using the selected eigenvector (**CST**, p 36, l 23); and training the kernel-based learning machine using at least a portion of the bisected dataset (**CST**, p 34, l 15-27).

Claim 2

CST anticipates after computing a plurality of eigenvalues, determining a number of clusters of data points within the dataset by identifying all zero eigenvalues (**CST**, p 94, l 12-20; p 33, l 29-32; p 35, l 8-16; p 33, l 13-14; EN: to one of ordinary skill in the art, the determination of zero eigenvalues will be the result of eigen decomposition where A is a linear transformation represented by a matrix A; if there is a vector X contained in space R superscript n that is not zero, then AX = λX for some scalar λ, then λ is called the eigenvalue of A with corresponding eignvector X; all zero eigenvalues will follow from the conditions for the matrix A being zero).

Claim 3

CST anticipates computing a second eigenvector (**CST**, p 33, l 13-14); and minimizing a cut cost for bisecting the dataset by applying a threshold to the second eigenvector (**CST**, p 33, l 14-22; p 94, l 21-38; EN: all optimization problems have thresholds).

Claim 4

CST anticipates the threshold limits the second eigenvector to entries of -1 and +1 (**CST**, p 33, l 29-33; p 159, l 33-42; EN: non-negative includes +1 and satisfies the claimed range; ratio's which would involve normalization establishes the =/- 1 range).

Claim 5

CST anticipates the data points within the dataset are unlabeled and the step of bisecting the dataset comprises assigning the data points to a cluster of a plurality of clusters (**CST**, p 11, l 7-11; EN: Unlabeled or uniformly labeled results in a trivial training exercise; initially the dataset will be unlabeled and to one of ordinary skill in the art, dividing such a dataset will result in at least two clusters).

Claim 6

CST anticipates selecting a kernel K (**CST**, p 151, l 26-33); normalizing the selected kernel K to -1< K <+1; and if both data points of a pair come from the first portion of the dataset, the corresponding kernel comprises a labels vector (**CST**, p 159, l 33-42; EN: see comments of claim 4).

Claim 7

CST anticipates calculating a second eigenvector of the kernel matrix to obtain an alignment (**CST**, p 156, l 29-41); thresholding the second eigenvector (**CST**, p 156, l 29-41); and based on the alignment, assigning labels to the unlabeled data points (**CST**, p 156, l 29-41).

Claim 8

CST anticipates adjusting at least a portion of the plurality of kernels to align the second eigenvector with a pre-determined label (**CST**, p 156, l 29-41).

Claim 9

CST anticipates prior to computing a plurality of eigenvalues, computing a first eigenvector and assigning a rank to each of the plurality of data points based on popularity (**CST**, p 156, l 29-41; EN: To one of ordinary skill in the art, it is generic to run an evaluation of a process, i.e. compute a first value and access the histogram).

Claim 10

CST anticipates identifying as dirty any data points of the plurality having a low rank (**CST**, p 156, l 29-41; EN: such is the effect of "margins").

Claim 11

CST anticipates cleaning the dirty data points (**CST**, p 156, l 29-41; EN: such is the use of "margins").

Claim 12

CST anticipates at least one kernel selected from a plurality of kernels for mapping data into a feature space, the at least one kernel selected by training the plurality of kernels on a dataset comprising a plurality of data points wherein the dataset is divided into a plurality of clusters by applying spectral graph theory to the dataset and selecting the at least one kernel that is optimally aligned with the division between the plurality of clusters (**CST**, p 151, l 5-33; EN: from the specification at page 10, l 2-5, the spectral graph concept regards the data set as the nodes of a fully connected graph).

Claim 13

CST anticipates the division between the plurality of clusters is determined by a first eigenvector in an adjacency matrix corresponding to a graph comprising a plurality of nodes comprising the plurality of data points (**CST**, p 153, l 25-41; EN: see comments regarding claim 1 above).

Claim 14

CST anticipates the dataset is unlabeled (**CST**, p 11, l 1-8; EN: y_i is the label and before it is labeled, it is unlabeled).

Claim 15

CST anticipates the dataset is partially labeled (**CST**, p 11, l 1-8; EN: y_i is the label and while the dataset is being labeled, some portions of the dataset remain unlabeled).

Claim 16

CST anticipates at least one kernel selected from a plurality of kernels for mapping data into a feature space, the at least one kernel selected by training the plurality of kernels on a dataset comprising a plurality of data points wherein the dataset is bisected into a plurality of clusters by applying spectral graph theory to the dataset and selecting the at least one kernel that minimizes a cut cost in the dichotomy between the plurality of clusters (**CST**, p 158, l 1-22; EN: a similarity score relates to a cut cost dichotomy in that one is the complement of the other; bisecting is related to clustering in families (**CST**, p 157, l 22-28); page 30, l 21-23; page 44, l 12-18; the spectral graph

concept regards the dataset as the nodes of a fully connected graph (specification, page 10, l 3-4).

Claim 17

CST anticipates the dichotomy between the plurality of clusters is determined by a first eigenvector in an adjacency matrix corresponding to a graph comprising a plurality of nodes comprising the plurality of data points (**CST**, page 94, l 12-20; page 33, l 16-32; EN: dichotomy relates to a division into two with a first eigenvector as a reference but the dichotomy is never completed since there is no identification of the second eigenvector; spectral graph theory is the study of the relationship between a graph and the eigenvalues of matrices (such as adjacency matrix) naturally associated to that graph).

Examination Considerations

7. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris,* 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

8. Examiner's Notes are provided to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and spirit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but a link to prior art that one of ordinary skill in the art would find inherently appropriate.

9. Examiner's Opinion:

Paras 6 and 7 above apply. The CST Applications of Support Vector Machines are to be read with the full support of the prior teachings of CST to include optimization techniques generic to one of ordinary skill in the art.

Conclusion

10. The prior art of record and not relied upon is considered pertinent to applicant's disclosure.

- Chung et al, ACM 0-89791
- Chung, ISBN 0-821-80315
- Fouss et al, Unite ISYS/AG

11. Claims 1-17 are rejected

Correspondence Information

12. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner, Joseph P. Hirl, whose telephone number is (703) 305-1668. The Examiner can be reached on Monday – Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anthony Knight can be reached at (703) 308-3179. Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

or faxed to:

(703) 746-7239 (for formal communications intended for entry);

or faxed to:

(703) 746-7290 (for informal or draft communications with notation of "Proposed" or "Draft" for the desk of the Examiner).

Joseph P. Hirl

July 13, 2004